



Development of Computerized Students' Project Management System (CSPMS) for Enhancing Students' Research in Public Universities in Akwa Ibom State

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Abstract

The study focused on the development of computerized project management system for enhancing students' research in public universities in Akwa Ibom State. The researchers embarked on this study in order to transform the current approach and methods used in managing the diversity of projects of final year students, ranging from the start of a project to completion and final hosting of the project online. The study adopted research and development design by Gall, Gall and Borg (2007), with four phases – Needs Assessment, Development of CSPMS, Validation of the CSPMS, and Trial-testing the CSPMS. The CSPMS was developed based on the Agile software development Model. The study's participants comprised 26 lecturers, 16 ICT staff and 65 students, and all from the Faculty of Education. The participants were selected based on their willingness to participate in the study. The instrument for data collection was a structured questionnaire that was face-validated by 3 experts in order to check for its suitability for the study. Cronbach Alpha reliability method was used to determine the reliability index (0.76) of the instrument. The data collected for the study were analyzed using mean scores and standard deviations. The findings of the study revealed that the CSPMS was very effective based on its functionality and participants' level of satisfaction with the system compared to the traditional form of project/thesis management in the universities. It was therefore recommended among others that the school administrators should adopt CSPMS to automate project/thesis management electronically, which is easier to use, manage, and faster in operations. Also, students and lecturers should be encouraged to use the new system for online project/thesis management since CSPMS is secured and can be accessed irrespective of geographical location.

Keyword: Software Development, Project, Project Management System, Students' Research, Computerization

Introduction

A project is an endeavor or task undertaken to create a unique product, service or result/outcome. According to Hampshire College (2020), a project is a process of systematic inquiry that entails the collection of data, documentation of critical information and analysis of data/information in accordance with suitable methodologies set by specific professional fields and academic disciplines. Projects require students to do an in-depth study of the topic they are to write and to go into the discipline to research about the concept that requires to be investigated. They are developed from researches conducted by researchers in order to answer research questions posed in the study. Projects are one of the final year requirements and criteria for graduation, which indicates that every student, having offered a number of courses and stayed the number of years required for successful graduation, must have encountered some issues in his disciplines that needs to be solved through investigation, analysis and reporting of findings.

Research project is one form of assessment the final year students carry out to test their ability to conceptualize and organize materials in a project form with a view to solving a problem. It is thus expected that a graduating student should master the skills and internalize the procedure for solving

societal problems through research approach. On the other hand, research can be described as a process through which new knowledge is discovered (U.S. Department of Health and Human Services, 2005; Kempen, 2012). It can also be defined as the creation of new knowledge and/or the use of existing knowledge in a new and creative way so as to generate new concepts, methodologies and understandings (O'Donnell, 2012). According to Kowalczyk and Scalia (2003), research is a careful and detailed study into a specific problem, concern, or issue using the scientific method.

Based on the definitions of research given above, a final year student in a Nigerian university is expected to write a research project to demonstrate mastery of skills and procedures for result-oriented research. This is done under the supervision and guidance of a lecturer called the project supervisor. When students are assigned supervisors, they must work with their supervisors to obtain project titles for approval. The title so approved is often generated from an identified problem. With the guidance of the supervisor, the student is expected to read wide on the area of concern in order to establish a wide range of literature. Research questions and hypotheses are also generated to guide the research after which data are collected from an identified and relevant population for the study. The data so collected are subsequently analyzed and interpreted with a view to drawing conclusion. Many social sciences and humanities programmes in public universities in Nigeria generally adopt the above approaches for students to successfully write a final year research project before graduation.

More often than not, some students find it difficult to successfully write their research projects due to the fact that either they are not well-guided to follow this procedure or that they fail to grasp the skills for doing so. It is against this backdrop that this study is undertaken to develop a software to enhance research project writing by students in public Universities thereby enabling a proper management of research project. Management is a process of planning, decision making, organizing, leading, motivation and controlling the human resources, financial, physical, and information resources of an organization to reach its goals efficiently and effectively (iEduNote, 2017). In the context of this study, management involves the process of planning, investigating, analyzing & reporting the outcome of a research in a project document. The skills taken in managing a project system include the appointment of project supervisors, selection and approval of a project topic, registering of the project topic, writing of project, data collecting process, review and correction of project and reporting research output. Most times, the manual project management system has caused severe trauma and stress to both the students and supervisors. Such issues include corrections made are sometimes not reflected; there is often lack of adequate and regular feedback from supervisors, inadequate or poor communication between the supervisor and supervisee, non-identification of plagiarism; it is hard to find out if the selected topic has been conducted before; huge money spent by distant students in mailing their projects through post offices which could be delayed and sometimes could be misplaced, among others. These problems have caused the delay of their graduation. This could lead to psychological trauma, helplessness, depression, and frustration leading some of them into crimes and desperate behaviours. Furthermore, some supervisors are hardly available in their offices and sometimes do not pick calls as well which drastically affects timely completion of research projects. In order to curb all of these issues, the researchers developed a computerized project management system (CSPMS) for an enhanced quality research product.

A Computerized Students' Project Management System (CSPMS) is a web application designed to assist students and academic supervisors in the selection, planning, organizing, investigating, and reporting of research projects and the resources applied to the projects. The CSPMS web-based application can be used to assign supervisees to supervisors, title selection and approval, materials' gathering and content development, content review, correction and approval for presentation/defence, and then the final production and submission for signing and distribution to the university, faculty and departmental libraries.



CSPMS is a web application that runs in the online web browser and stores its critical documents in the cloud. A web application is a computer program that utilizes web browsers and web technologies to perform tasks over the internet (StackPath, 2016; Ern, 2019; indeed, 2022). The web applications are usually coded in browser-supported languages such as HTML5, Cascading Style Sheet (CSS), PHP, MySQL and JavaScript as these languages rely on the browser to render the program executable. The application can however be accessed by the end-user through a web browser such as Google Chrome, Safari, Mozilla Firefox, Edge or any other web browser. In the development of CSPMS website, there are several modules that are considered and incorporated into it. These modules include Registration Module (for registering new users under the following sections: students, lecturers, and the Head of Department); Upload and Download Modules (for uploading of documents like abstracts, main project, corrected versions, or synopsis by the students, and as well for downloading the necessary documents by the lecturer/supervisor); Previous Year Project Module (for maintaining the previous years' project details so that users/supervisees can download previous projects in the archive for use as a guide to writing their own projects); Notification Module (for sending the necessary instructions or notifications regarding the project process which can be viewed by students); Admin Module (for processing various functions such as assigning supervisees to supervisors, uploading of project guides, announcements, announcements/notifications regarding seminar defence or meetings, etc.); Student Module (for abstract submission as well as thesis or any other project related documents' submissions); Project Allocation Module (to help students identify researchable cases before submitting to the project supervisor for approval); Communication Module (for general communication between students, lecturers and the Head of Department); Project management Module (it provides a new and convenient channel for meeting and discussion between students and supervisors, and it includes chat and messaging functionalities which are provided for students to discuss with their supervisors one-on-one); File Sharing and Repository Modules (for sharing of source codes, documents and other important resources related to the project with lecturers/supervisees and others); Submission and Grading Module (it enables students to submit/upload their final projects to the system for final assessment and grading/reporting by the supervisors).

In developing a standard software such as a web application, programmers often choose a software development model that meets with the requirements of such software. This is also known as Software Development Life Cycle and it has phases. Software models include the Waterfall, Spiral, V-Shape, Rapid Application Development (RAD), prototype, agile, Incremental and Iterative models. The present study adopted the Agile software development model. The Agile software development methodology centers around time-boxed project cycles known as sprints (QualityLogic, 2022). It is the advanced model of Waterfall. The choice of Agile model is based on the fact that final year students are often given a shorter period of time to complete their final year projects in order to enable them graduate on time. Secondly, the new system to be developed would not be too large to necessitate the use of the Waterfall model, which may affect timely release of the new system. Agile model is a model that guides the development of a time-bound web-based systems that require regular evaluation by in-house users, and it is flexible enough to adjust to future situations (SimpliLearn, 2022). The phases of Agile software development model are Planning, System Analysis and Requirement, System Design, Development, Integration and Testing, Implementation, Operations & Maintenance.

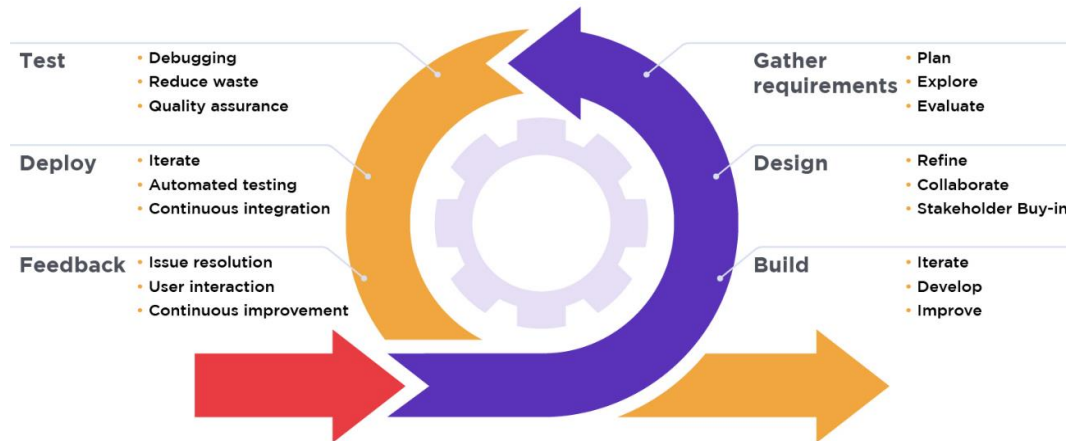


Figure 1: Stages of Agile Modelling
Source: SimpliLearn (2022)

Statement of the Problem

The traditional (manual) method of project management which has been very inconvenient for both students and lecturers needs to be reconsidered based on certain shortcomings observed in its implementation over the years in Nigerian universities. The delay in the submission of projects by students leads to delay in students' graduation. Lack of proper communication can be another bottleneck hindering completion of a project. The traditional system does not enable easy communication as it requires physical presence between the supervisor and supervisee. The manual process is considerably difficult in a situation where there is a need to locate student's files to retrieve previously stored record because it takes a long time due to the volume of submissions and sometimes, the record or data sought may not necessarily exist or have been misplaced. Moreover, in the event of any losses or damages to students' project files and no backup files are available, the students may risk restarting the work afresh, which is often disheartening considering the efforts put in by the student in writing the project. Furthermore, the continuous printing of project for the purpose of correction at the different levels of the project research processes is very expensive and, in most cases, students' do not have enough resources to cope with such requirements. Final year project is a major criterion in tertiary education for successful graduation of students after staying the required number of years stipulated by institutions. It is based on the aforementioned that the researchers developed a web-based student project management system for easy and quick handling of students' project matters.

Purpose of the study

The main purpose of this study was to develop a Computerized Students' Project Management System (CSPMS) for enhancing students' research in public Universities in Akwa Ibom State. Specifically, this study sought to:

1. determine the objectives of CSPMS
2. determine the software requirements for developing the CSPMS
3. development of the CSPMS
4. validate the CSPMS
5. trial test the developed CSPMS



Methodology

The study was conducted in two public universities (University of Uyo and Akwa Ibom State University) in Akwa Ibom State. The study adopted research and development design by Gall, Gall and Borg (2007), with four phases – Needs Assessment, Development of CSPMS, Validation of the CSPMS, and Trial-testing the CSPMS. The CSPMS was developed based on the Agile software development Model with the following phases: Planning, System Analysis and Requirement, System Design, Development, Integration and Testing, Implementation, Operations & Maintenance. The study’s participants comprised 26 lecturers, 16 ICT staff and 65 students, and all were selected from the Faculty of Education in the respective universities covered in this study. The participants were selected based on their willingness to participate in the study.

A questionnaire titled “Computerized Students’ Project Management System Questionnaire” (CSPMSQ) was developed by the researchers as the instrument for data collection. The questionnaire is made up of two parts: The Part A comprising of demographics and Part B for eliciting information from respondents based on the specific purposes posed in the study. The specific purposes 1 and 2 have four-point rating scale coded as follows: 4 = Highly Important (HI), 3= Important (I), 2 = Slightly Important (SI) and 1 = Not Important (NI); while specific purposes 3 and 4 have four-point rating scale with the following coding sequence: 4 = Strongly Agree (SA), 3 = Agree (A), 2 = Disagree (D) and 1 = Strongly Disagree (SD). The instrument was face-validated by 3 experts in order to check for its suitability for the study. Cronbach Alpha reliability method was used to determine the reliability index (0.76) of the instrument.

The instrument (CSPMSQ) was administered to the respondents with the assistance of three research assistants. The research assistants were briefed on the modalities for distributing and collecting the questionnaire from the respondents on the spot. This was to ensure that the respondents appropriately completed the questionnaire with high-return rate. The data collected for this study were analyzed using mean scores and standard deviations. The analysis was done in SPSS version 22. For the interpretation of the results, items greater than or equal to 3.50 are Highly Important (HI)/Strongly Agree (SA); items greater than or equal to 2.50 and less than 3.50 are Important (I)/Agree (A); items greater than or equal to 1.50 and less than 2.50 are Slightly Important (SI)/Disagree (D); and items less than 1.50 are Not Important (NI)/Strongly Disagree (SD).

Presentation and Analysis of Data

This section presents in tables the results of the analysis of the data collected for the study, according to the specific purposes.

Objective 1: the objectives of CSPMS

Table 1

Mean Scores and Standard Deviations of Responses of Respondents on the Objectives of the Computerized Students’ Project Management System (CSPMS) for Universities in Akwa Ibom

S/N	ITEMS	Mean	SD	DECISION
1	Registration of students’ topics	3.59	0.505	HI
2	Documentation of projects	3.46	0.511	I
3	Approval of project topic	3.58	0.585	HI
4	Update students’ and lecturer records regularly	3.45	0.542	I
5	Scheduling of project defense	3.64	0.482	HI
6	Project submission and defense	3.45	0.521	I
7	Communication between lecturer and student	3.38	0.600	I
8	Backup records of students and lecturer regularly	3.40	0.502	I

9	Track project progress	3.50	0.608	HI
10	Set deadline of task	3.43	0.508	I
11	Set notification of activities	3.44	0.627	I

The data presented in Table 1 showed that items 1, 3, 5, and 9 have mean values ranged from 3.50 to 3.64 indicating that the items were rated Highly Important (HI) while the rest of the items have mean values ranged from 3.38 to 3.46 indicating that the items were rated Important (I) by the respondents. This implies that the respondents agreed that the items constitute the objectives of Computerized Students' Project Management System (CSPMS). The standard deviations of the items ranged from 0.482 to 0.627 which revealed that the respondents were close to one another in their opinions.

Objective 2: the software requirements for developing the CSPMS

Table 2

Mean Scores and Standard Deviations on the Software Requirements of the New System

S/N	ITEMS	Mean	SD	DECISION
12	Programming/Scripting language - JavaScript	3.39	0.667	I
13	Local Server – XAMP, WAMP, etc.	3.26	0.585	I
14	HTML	3.55	0.632	HI
15	CSS	3.54	0.531	HI
16	Web Browser	3.54	0.570	HI
17	Oracle	3.27	0.503	I
18	My SQL	3.37	0.546	I
19	PHP	3.44	0.498	I
20	Apache	3.47	0.541	I

The data presented in Table 2 showed that items 14 - 16 have mean values above the real limit of 3.50 indicating that the items were rated Highly Important (HI) while the rest of the items were rated Important (I) since their mean values ranged from 3.26 to 3.47. This implies that the respondents agreed that all the items in the Table are the items constitute the software requirements for developing CSPMS. The standard deviations of the items ranged from 0.503 to 0.667 which indicate that the respondents were close to one another in their opinions.

Objective 4: validation of the CSPMS

Table 3

Mean and Standard Deviation on the Level of Acceptance of CSPMS by ICT Experts

S/N	ITEMS	Mean	SD	DECISION
21	CSPMS has a standard user interface	3.62	0.489	SA
22	CSPMS is compatible with mobile platforms	3.61	0.491	SA
23	Students' record/profile were registered successfully	3.64	0.546	SA
24	The Login task is functional	3.50	0.563	SA
25	Downloading of projects is easy and fast	3.52	0.600	SA
26	Uploading of projects is fast and easy	3.50	0.502	SA
27	Change of user's record was simple and flexible	3.57	0.582	SA
28	The approval of project was done without any errors	3.52	0.497	SA



The data presented in Table 3 showed that all the items have their mean values ranged from 3.50 to 3.64 which indicate that ICT Experts Strongly Agreed (SA) with all the items that evaluated the functionality of CSPMS. On the other hand, the standard deviation of the items ranged from 0.491 - 0.648 indicating that the respondents were close to one another in their opinions.

Objectives 5: trial test the developed CSPMS

Table 4

Mean and Standard Deviation on the Extent to which Users are Satisfied with the CSPMS				
S/N	ITEMS	X	SD	DECISION
29	CSPMS has the potential to improve productivity	3.51	0.544	SA
30	The user interface is appealing	3.48	0.502	A
31	The system is easy to use	3.52	0.544	SA
32	CSPMS is very effective in performing tasks	3.49	0.564	A
33	CSPMS is great in storing project documents and other vital information	3.54	0.616	SA
34	CSPMS is user-friendly	3.43	0.539	A
35	The system allows me to conveniently track the progress of my project and set deadlines.	3.61	0.513	SA
36	CSPMS provides quick response to action	3.52	0.523	SA
37	I will be glad to have the CSPMS to make my project management process easier	3.57	0.539	SA
38	I am willing to recommend this software (CSPMS) to my institution	3.46	0.533	A
39	With CSPMS, I can easily dialogue with my supervisor on difficult or confusing aspects of my projects	3.57	0.540	SA
40	I like the way the CSPMS registered and stored user records	3.46	0.514	A

The data presented in Table 4 above showed that items 29, 31, 33, 35, 36, 37 and 39 have their mean values ranged from 3.51 to 3.61 indicating that the respondents (users of CSPMS) Strongly Agreed (SA) with the items. However, the remaining items (30, 32, 34, 38 and 40) have their mean values ranging from 3.43 to 3.49 which indicate that the respondents Agreed (A) with the items. This implies that the respondents found the CSPMS very satisfactory in managing students’ projects online from conception to final assessment and grading. The standard deviations of the items ranged from 0.502 to 0.616, indicating that the respondents were close to one another in their opinions.

Discussion of Findings

The findings of the study based on specific objectives one revealed that the respondents agreed with all the objectives of the Computerized Students’ project Management System. The items that constituted the objectives of CSPMS were all rated as important. This is in line with Nwangwu, Omeh and Okorie (2020), Ogba and Nwangwu (2021) and Nwangwu, Obichukwu, Uzuagu and Omeh (2021) who found out that every electronic training system should meet certain objectives that will guide its development and deployment. This is also consistent with what Okorie (2014) pointed out that there are needs that are specific to each software project, which require an understanding of the objectives of the task that the user needs to accomplish with the desired application.

The findings on specific purpose two revealed that the software requirements for developing CSPMS are Programming/Scripting language – JavaScript, Local Server – XAMP, WAMP, etc.,

HTML, CSS, Web Browser, Oracle, My SQL, PHP, and Apache. Among all the software requirements, HTML, CSS and Web Browser were rated highly important by the respondents, in developing the CSPMS. This agrees with Timotic (2018), who listed most popular Client-Side Scripting technologies to include: HTML (HyperText Markup Language), CSS (Cascading Style Sheets), JavaScript Ajax (Asynchronous JavaScript and XML), etc. while the most popular Server-Side Scripting technologies include: PHP (usually combines with MySQL database), ASP.NET (Microsoft's Web Application Framework – successor of ASP), etc.

The data presented in Table 3, addressed specific purpose four which focused on the validation of the CSPMS by ICT Experts. The findings revealed that ICT experts rated CSPMS as an effective functional system that can handle students' project management electronically with ease. The CSPMS's interface is found to be standard, it is compatible with mobile platforms, students' record/profile were registered successfully in the CSPMS, if has functional download and upload functions, projects were assessed and approved successfully, among others. This is in line with Nwangwu, Omeh and Okolie (2021) and Nwangwu (2018) whose developed software/web app were rated very functional by ICT Experts who evaluated their functionalities.

The data presented in Table 4, addressed specific purpose five which presented results on the trial-testing of CSPMS by users (students and lecturers). The findings revealed that students and lecturers are satisfied with the new system (CSPMS) based on certain tested criteria which include improved productivity, ease of use, user-friendliness, user registration and storage of records, quick response to user actions, among others. The findings also revealed that the respondents are willing to have the CSPMS for project management in their respective schools; and are willing to recommend CSPMS to their respective institutions. This is in line with Nwangwu (2018) whose study revealed that users were satisfied with the developed an Interactive PowerPoint Presentation Design Training Package (IPDTP) for Lecturers of Tertiary Institutions in the South-East Nigeria.

Conclusion

The traditional method of managing students' projects has been the order of the day in universities especially in public universities in Akwa Ibom State. However, this method has had a lot of shortcomings ranging from cost of printing project documents, the delay in the submission of projects by students leading to delay in students' graduation, lack of proper communication between supervisors and supervisees based on distance or location to possible misplacement of project documents with no backup hosted online. In order to address these challenges, the researchers developed a Computerized Students' Project Management System that will ensure a convenient and effect students' project management process being that the final year project is a very integral part of assessment required for graduation. The findings of the study revealed that the objectives and software requirements for developing CSPMS were very important; the ICT Experts who evaluated the new system approved its functional elements indicating that CSPMS had a high level of acceptance; and the users (students and lecturers) who trial-tested the CSPMS were very satisfied with the operations and capability of the new system.



Recommendations

Based on the findings of the study, the following recommendations were made

1. school administrators should adopt CSPMS to automate project/thesis management electronically, which is easier to use, manage, and faster in operations.
2. students and lecturers should be encouraged to use the new system for online project/thesis management since CSPMS access to the new system is assured irrespective of geographical location
3. Trainings should be carried out for both lecturers and students to educate them on how to use the computer and the CSPMS for project management.

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